Check List the journal of biodiversity data
NOTES ON GEOGRAPHIC DISTRIBUTION

Newly recorded for the vascular flora of Abu Dhabi: *Maerua crassifolia* Forssk. (Capparaceae)

Sabitha Sakkir[1], Salama Al Mansouri[1], Maitha Al Mansouri[2], Saif Khalfan Al Mansouri[1], Lahej Al Mansouri[2], Maher Kabshawi[1]

1 *Plant Genetic Resources Centre, Terrestrial and Marine Biodiversity Sector, Environment Agency, Abu Dhabi*
2 *Plant Resources and Habitat Restoration, Terrestrial and Marine Biodiversity Sector, Environment Agency, Abu Dhabi*

Corresponding author: *Sabitha Sakkir (ssakkir@ead.gov.ae)*

Abstract. During the floristic surveys in 2020–2023 in the United Arab Emirates, we recorded *Maerua crassifolia* Forssk., which is new to the flora of the Emirate of Abu Dhabi. This species has a distribution across Africa, through the Arabian Peninsula, to Iran and Pakistan. We discuss the geographic range of this species, its presence in the Arabian Peninsula, and its conservation status. Our new record expands the geographic distribution of the species and highlights the importance of expanding botanical surveys to increase the knowledge on the floral diversity of the emirate.

Key words. Arabian Peninsula, biogeography, conservation, endemism, United Arab Emirates

Sakkir S, Al Mansouri S, Al Mansouri M, Al Mansouri SK, Al Mansouri L, Kabshawi M (2024) Newly recorded for the vascular flora of Abu Dhabi: *Maerua crassifolia* Forssk. (Capparaceae). Check List 20 (2): 499–504. https://doi.org/10.15560/20.2.499

INTRODUCTION

Abu Dhabi, the largest emirate of the United Arab Emirates (UAE), covers an area of roughly 67,340 km^2 and supports diverse habitat types with characteristic flora and fauna (Sakkir et al. 2021). The major terrestrial ecosystems include inland sand sheets and dunes, alluvial and interdunal plains, mountains and wadis, coastal sand sheets, and coastal and inland sabkha (Brown and Böer 2005); the mountains support the highest species diversity (Sakkir and Brown 2014). With its arid to hyper-arid climate, large tracts of the landscape are sandy or sand-gravelly deserts. Only in the far east, in the vicinity of Al Ain, a small mountainous area is present with associated alluvial plains. The Al Ain region of the emirate has most of the floristic diversity due to its varied climatic conditions which result from the altitudinal range; these conditions have a significant influence on the spatial distributions of plant diversity. The Emirate of Abu Dhabi is home to around 436 species of native plants distributed in diverse habitats (Al Dhaheri et al. 2017). The vegetation mainly comprises shrubs and dwarf shrubs, which are mainly perennials species, herbaceous plants, which include both annuals and perennials, graminoids, and trees (Al Dhaheri et al. 2017). The native tree species are represented in Abu Dhabi flora by about 15 species, which are mainly distributed on the sand sheets and sand dunes, rocky hill slopes, and alluvial plains.

The genus *Maerua* Forssk. comprises a diverse group of flowering plants represented by over 50 species distributed mainly in the tropics and southern Africa to India (Kamel et al. 2009). The genus mainly includes trees and shrubs occurring in various habitat types such as sand, gravelly and silty soils, and rocky slopes. This genus, commonly known as capers, belongs to the family Capparaceae. In the Arabian Peninsula, *Maerua* occurs in Oman, Saudi Arabia, and Yemen, and four species of *Maerua* are known from the peninsula (Miller and Cope 1996). These include *M. angolensis* DC., *M. crassifolia* Forssk., *M. oblongifolia* (Forssk.) A.Rich., and *M. triphylla* A.Rich.

During the floristic studies conducted at the eastern region of the Emirate of Abu Dhabi, collection efforts led to the finding of *Maerua crassifolia*. We report *M. crassifolia* for the first time from the emirate, and this record fills a gap in the known distribution of this species. We also provide photos and distribution map contributing to the knowledge of species ecology and distribution.

METHODS

Floristic surveys were carried out across several ecosystems in the eastern region of the Emirate of Abu Dhabi during 2020–2023 to document plant species. The ecosystems surveyed include sand sheets,

OPEN ACCESS

Academic editor: Radosław Puchałka
Received: 3 January 2024
Accepted: 10 February 2024
Published: 13 March 2024

Copyright © The authors. This is an open-access article distributed under terms of the Creative Commons Attribution License (Attribution 4.0 International – CC BY 4.0)

Figure 1. *Maerua crassifolia* Forssk. **A.** Habit. **B.** Clustered leaves on the branches. **C.** Flowers, represented by 30–40 stamens. **D.** Mature fruit. **E.** Fruits bagged to prevent insect attack. **F.** Seeds.

mountains and wadis, gravel plains, and urban habitats. The surveys were made during the summer and winter months. The field attributes were collected using an iPad-based IOS Collector App, which directly syncs with the plant database of the Environment Agency – Abu Dhabi (EAD). Specimens were collected and deposited in the EAD Herbarium. Specimens were identified using relevant literature and floras (Jongbloed et al. 2003). The distribution map was prepared using ArcGIS v. 10.8.2 (ESRI 2019). Photographs of plant parts were taken in the field and deposited in the EAD photo library.

RESULTS

***Maerua crassifolia* Forssk.**, Fl. Aegypt. –Arab. CXIII 1. 104 (1775).
Figures 1, 2

New record. UNITED ARAB EMIRATES – Abu Dhabi Emirate • Al Ain, Malaqit; 24°09.491′N, 055°56.668′E; alt. 392 m; 15.III.2023; Sabitha Sakkir leg.; EAD4026.

Additional specimen examined. UNITED ARAB EMIRATES – Abu Dhabi Emirate • Al Ain, Al Shwayb near Oman border, alt. 220 m; 07. I.1997; Fawzi M. Karim leg.; 12896 (ABDH!)

Identification. Tree, 200–500 cm tall. Branches ascending, divaricate, intricate, greyish, slightly pubescent. Leaves simple, fleshy, pubescent, short-petiolate (1–3 mm), varied in shape, oblanceolate to obovate, 10–15 × 7–10 mm, macronulate or obtuse, cuneate at base. Flower solitary or in 2-flowered clusters, axillary, actinomorphic. Flower pedicel 8–10 mm, erect pubescent; flower bracteate, 4–12 mm. Sepals

Environment Agency - Abu Dhabi
EADHB-0002802
Environment Agency - Abu Dhabi
Latin name: Maerua crassifolia Forssk.
Family: Capparaceae
Arabic name: العرج
Collection No: EAD4026
General Locality: Malaqit, Al Ain
Collection date: 15 March 2023
Description: Tree up to 5m tall. Leaves small, clustered along the branches. Flowers single or in cluster of 2. Petals absent. Stamens 35-40. Fruits constricted between seeds. Flowering from February to April
Location coordinates: N: 24.15816
E:55.94439
leg.: EAD flora team
det.: Sabitha Sakkir

Figure 2. *Maerua crassifolia* Forssk. Specimen deposited in the EAD Herbarium.

4, equally pilose, 4–10 × 3–4 mm, oblong, reflexed. Petals absent. Stamens 30–40; filament 4–5 mm, androphore present, shorter than gynophore. Gynophore 5–8 mm, pubescent; ovary 1–2 mm; narrowly cylindrical, filament very short 2–3 mm. Fruit pedicel 3–12 mm. Fruit a fleshy berry, densely pubescent, cylindrical constricted to 2–3 globose sections, 25–70 × 3–6 mm, peak 2–3 mm. Seeds 2–3, somewhat round, glabrous with ribbed surface, 4–8 mm in diameter.

Maerua crassifolia can be distinguished from the closely related *M. oblongifolia* mainly by the growth form, pubescence, and the absence of petals. *Maerua oblongifolia* is characterized by broadly to narrowly oblong leaf and presence of petals.

Distribution. Globally, the species has a distribution across Africa, through the Arabian Peninsula, to Iran and Pakistan (POWO 2024). In the Middle East, this species is recorded from Oman, Saudi Arabia, and Yemen. The previously known records of this species within the UAE are from northern Ras al Khaimah (Jongbloed et al. 2003; Feulner and Roobas 2013). In the Emirate of Abu Dhabi, the new occurrence is from Al Ain in the eastern region of the emirate (Figure 3).

Phenology. Flowering was observed from February to late April. The fruiting was observed from April to May and the mature seeds were collected in June.

Habitat. The single tree of *M. crassifolia* was growing on a rocky slope, in an extremely fragmented habitat. The associated perennial species at the base of the rocky slope include *Calligonum crinitum* Boiss., *Cyperus conglomeratus* Rottb., *Haloxylon salicornicum* (Moq.) Bunge ex Boiss., *Stipagrostis plumosa* (L.) Munro ex T.Anderson , *Tribulus arabicus* Hosni, and *Zygophyllum indicum* (Burm.f.) Christenh. & Byng. The perennial tree *Vachellia tortilis* (Forssk.) Galasso & Banfi was also recorded from the rocky slopes but at lower altitudes. The associated annuals include *Arnebia hispidissima* (Sieber ex Lehm.) A.DC., *Eremobium aegyptiacum* (Spreng.) Asch. ex Boiss., *Gymnocarpos sclerocephalus* (Decne.) Dahlgren & Thulin, and *Savignya parviflora* (Delile) Webb. The common invertebrates associated with *M. crassifolia* included bees, wasps, and spiders, and mostly these were seen during the flowering season of *M. crassifolia*.

Conservation status. Globally *M. crassifolia* is assessed as Least Concern based on the IUCN Red List (Oldfield 2020). The species is assessed as Critically Endangered in the UAE National Red List of plants, based on the inference that there are fewer than 50 mature individuals in the country (Allen et al. 2021). Based on our new record it is likely that *M. crassifolia* may also qualify for a threatened category under criterion B, based on the probably restricted extent of occurrence (EOO) and area of occupancy (AOO). Further surveys and other research are needed to confirm this species' distribution, origin, and population size to better assess its conservation status in the Emirate of Abu Dhabi.

DISCUSSION

The Arabian Peninsula is renowned for its unique and varied ecosystems, which host a myriad of plant species adapted to the region's harsh, arid environments. Within the Arabian Peninsula, two species of *Maerua* have been recorded from Oman, three species from Saudi Arabia, and four species from Yemen (Miller and Morris 2004; Miller and Cope 1996; Collenette 1999). These species usually occur in drier areas with sandy, gravelly, and silty soils.

Maerua crassifolia have been documented in the neighboring areas of Oman in the Ru'us al-Jibal and Buraimi area, which is the main range of species in the eastern Arabian Peninsula (Feulner 2011). The species also occurs at Jebel Qatar and especially from Wadi Jizzi southwards in Oman, which is close to the UAE (Feulner 2016). The only published records of this species within the UAE are from adjacent wadis in northern Ras al Khaimah, where a few scattered individuals have been reported (Jongbloed et al. 2003; Karim and Fawzi 2007; Feulner and Roobas 2013). The new occurrence of *M. crassifolia* is at the eastern most limit of its geographic range and the only confirmed occurrence in the far east of the Emirate of Abu Dhabi.

Maerua crassifolia has tap roots that can extend deep into the ground to the water table. This hardy tree species can tolerate very harsh desert conditions, which helps it to grow in regions where the mean annual rainfall can be as low as 100–400 mm and the dry season as long as 11 months (Maydell 1990). Because of these characteristics, this species can also thrive well in hyper-arid climatic conditions of the

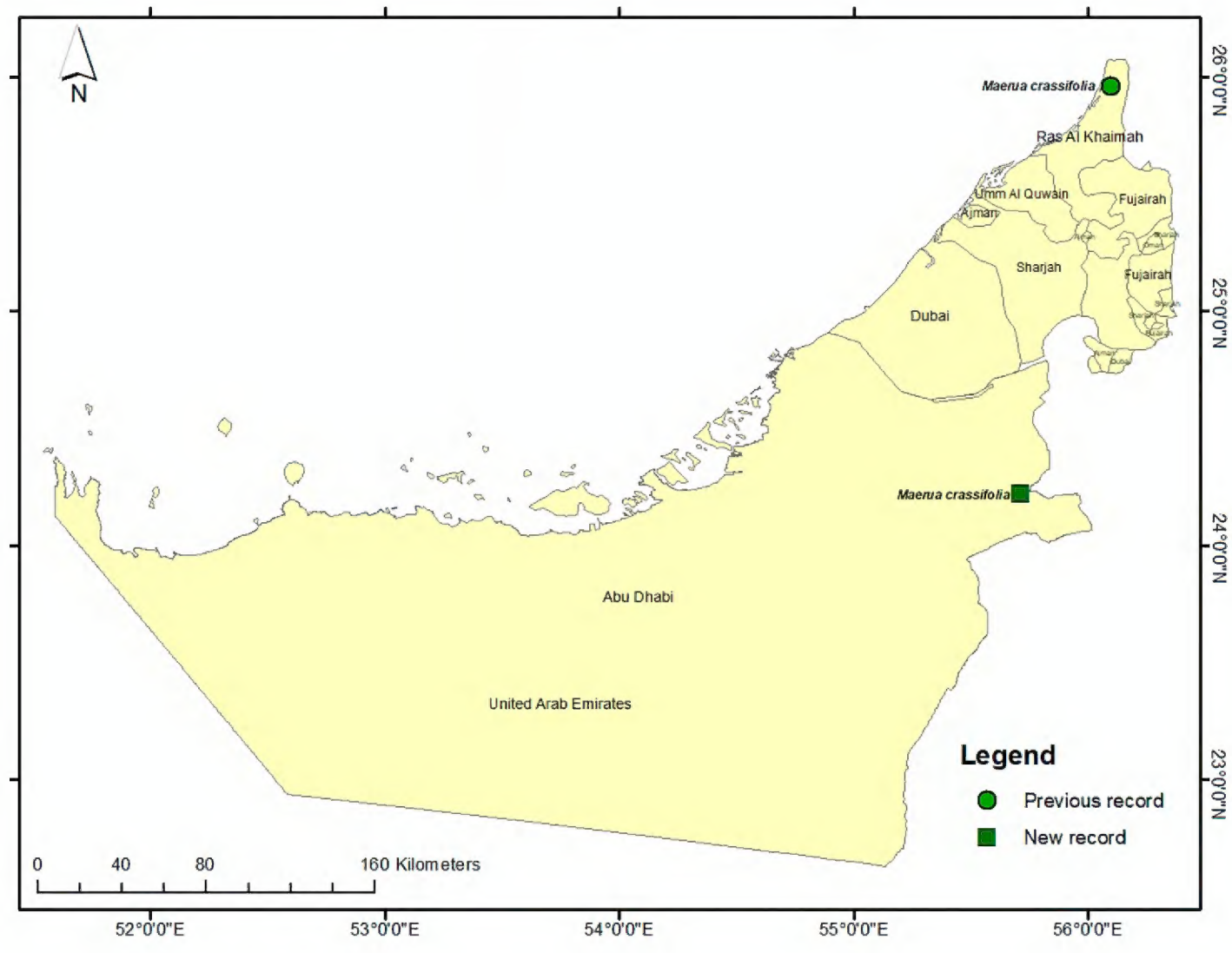

Figure 3. Distribution of *Maerua crassifolia* Forssk in the UAE. The previous record from the northern emirates (●) and the new record (■) from the eastern region of the Emirate of Abu Dhabi.

Emirate of Abu Dhabi. Locally known as "Sarh" or "Meru", *M. crassifolia* has many uses in traditional medicine (Ghazanfar 1994). The leaves and ripe fruits are eaten. The species is also used as a good fodder plant (Diatta et al. 2007).

In the recent years many of the natural ecosystems have come under threat from overgrazing and ecosystem fragmentation due to the inevitable increase in urban, industrial, and tourism developments. Many non-native species have been recently introduced with food, livestock, and forestry imports, and some are having detrimental effects on native species. In this regard, we have designed systematic monitoring programs to monitor *M. crassifolia* and its habitat.

Local conservation measures are also in place to conserve this rare tree species in the Emirate of Abu Dhabi, and these could reduce the risk of extinction of the species in the near future. The species is protected under the Federal Law 24 of 1999. *Ex situ* conservation measures are underway. Seeds have been collected from the wild and propagation trials are ongoing under laboratory conditions. Tissue culture and genomic studies are underway.

The new record of *M. crassifolia* from the Emirate of Abu Dhabi adds to the information on the species diversity of the eastern region of the emirate. This new record not only expands the AOO of this species but also its geographic range. This information can be used for the local assessment of species following the B criterion of the International Union for Conservation of Nature Red List (IUCN 2012). It is possible that the distribution of *M. crassifolia* in the emirate is larger, with a bigger population. More studies are necessary to determine the extent of its distribution in the region. The new record also highlights the need to increase collection efforts and other floristic surveys in the emirate; these would help increase knowledge of the emirate's floral diversity.

ACKNOWLEDGEMENTS

We express our gratitude to Ahmed Abdulla Al Dhaheri, Environment Agency – Abu Dhabi for capturing field photographs. Thanks to our colleagues who contributed to the field efforts. We are thankful to Dr. Richard Perry, Environment Agency – Abu Dhabi, for the thorough review of the manuscript. We sincerely thank the academic editor and reviewers for taking the time to review and provide constructive feedback on our manuscript.

ADDITIONAL INFORMATION

Conflict of interest

The authors declare that no competing interests exist.

Ethical statement

No ethical statement is reported.

Funding

This study was financially supported by the Environment Agency-Abu Dhabi.

Author contributions

Conceptualization: SS, SAM. Data curation: SS, SAM, MAM, SKAM, LAM, MK. Formal analysis: SS, SAM. Methodology: SS, SAM. Resources: SS, SAM, MAM, SKAM, LAM, MK. Supervision: SS, SAM MK. Project administration: SS, SAM. Software: SS. Validation: SS, SAM, MK. Writing – original draft: SS, SAM. Writing – review and editing: SS, SAM, MAM, SKAM, LAM, MK.

Author ORCID iDs

Sabitha Sakkir https://orcid.org/0000-0002-7603-9249
Maitha Al Mansouri https://orcid.org/0000-0003-2897-4571

Data availability

All data that support the findings of this study are available in the main.

REFERENCES

Allen DJ, Westrip JRS, Puttick A, Harding KA, Hilton-Taylor C, Ali H (2021) UAE National Red List of vascular plants. Technical report. Ministry of Climate Change and Environment, United Arab Emirates, Dubai, UAE, 50 pp.

Al Dhaheri S, Javed S, Alzahlawi N, Binkulaib R, Cowie W, Grandcourt E, Kabshawi M (2017) Abu Dhabi Emirate habitat classification and protection guideline. Environment Agency – Abu Dhabi, UAE, 75 pp. https://www.ead.gov.ae/storage/Post/files/61750cb51f3aa058f3d8a9f34a00356c.pdf. Accessed on: 2021-02-24.

Brown G, Böer B (2005) Terrestrial plants. In: Hellyer P, Aspinall S (Eds.) The Emirates—a natural history. Trident press, London, UK, 141–155.

Collenette S (1999) Wildflowers of Saudi Arabia. National Commission for Wildlife Conservation and Development, Riyadh, Saudi Arabia. https://www.worldcat.org/title/wildflowers-of-saudi-arabia/oclc/42968766. Accessed on: 2021-02-24.

Diatta S, Houmey VK, Zoungrana KCY, Banoin M, Akpo LE (2007) Possibilité de multiplication végétative par bouturage chez un ligneux fourrager sahélien: *Maerua crassifolia* (Forsk), Capparidaceae. Afrique Science 3 (2): 271–283. https://doi.org/10.4314/afsci.v3i2.61272

ESRI (2019) ArcGIS Desktop: release 10.8. Environmental Systems Research Institute, Redlands, CA.

Feulner GR (2011) The Flora of the Ru'us al-Jibal—the mountains of the Musandam Peninsula: an annotated checklist and selected observations. Tribulus 19: 4–153.

Feulner GR (2016) The flora of Wadi Wurayah National Park, Fujairah, United Arab Emirates: an annotated checklist and selected observations on the flora of an extensive ultrabasic bedrock environment in the northern Hajar Mountains. Tribulus 24: 4–84.

Feulner GR, Roobas B 2013 Field clips: butterfly tree. Gazelle, Dubai Natural History Group 28 (4): 5.

Forsskål P (1775) Flora Aegyptiaco-Arabica: sive descriptiones plantarum. Möller, Hauniae (Copenhagen), 219 pp. https://doi.org/10.5962/bhl.title.41

Ghazanfar SA (1994) Handbook of Arabian medicinal plants. Springer, New York, USA, 265 pp.

IUCN (2012) IUCN Red List categories and criteria: version 3.1. Second edition. International Union for the Conservaton of Nature, Gland, Switzerland and Cambridge, UK, iv + 32 pp.

Jongbloed MVD, Feulner GR, Böer B, Western AR (2003) The comprehensive guide to the wildflowers of the United Arab Emirates. Environmental Research and Wildlife Development Agency, Abu Dhabi, 576 pp.

Kamel W, Abd El-Ghani MM, El-Bous M (2009) Taxonomic study of Capparaceae from Egypt: revisited. African Journal of Biotechnology 3: 27–35.

Karim FM, Fawzi NM (2007) Flora of the United Arab Emirates Volume1. United Arab Emirates University, Al-Ain, UAE, 445 pp.

Maydell VHJ (1990) Trees and shrubs of the Sahel; their characteristics and uses (no. 196). Verlag Josef Margraf, Scientific Books, Weikersheim. 525 pp.

Miller AG, Morris M (2004) Ethnoflora of the Soqotra Archipelago. Royal Botanic Garden Edinburgh: Edinburgh; 1st edition, 776 pp.

Miller AG, Cope TA (1996) Flora of the Arabian Peninsula and Socotra, vol. 1. Edinburgh University Press, Edinburgh, UK, 586 pp.

Oldfield S (2020) *Maerua crassifolia*. The IUCN Red List of Threatened Species 2020: e.T137749048A165379886. https://doi.org/10.2305/iucn.uk.2020-2.rlts.t137749048a165379886.en. Accessed on 2023-06-31.

POWO (2024) Plants of the World Online. Facilitated by the Royal Botanic Gardens, Kew, UK. http://www.plantsoftheworldonline.org/. Accessed on: 2024-02-08.

Sakkir S, Brown G (2014) New records for the flora of Jebel Hafeet. Tribulus 22: 62–65.

Sakkir S, Arunraj PT, Al Mansoori M, Soorae P (2021) *Bidens* L. (Coreopsideae, Asteraceae), a new generic record for Abu Dhabi, United Arab Emirates. Check List 17 (4): 1049–1053. https://doi.org/10.15560/17.4.1049